

REMARKS

Upon entry of the above-identified amendment, claims 1-8 and 11-19 will be pending, wherein claim 1 will be amended. Applicants respectfully request favorable reconsideration and entry of the above-identified amendment in view of the remarks presented herein below.

In paragraph 2 of the Office Action (“Action”), the Examiner rejects claims 1-19 under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,814,194 to Deguchi et al. (“Deguchi”), in view of U.S. Patent No. 6,238,582 to Williams et al. (“Williams”). Applicant respectfully traverses this rejection.

In order to support a rejection under 35 U.S.C. §103(a), the Examiner must establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some motivation or suggestion to combine the cited references. Second, there must be a reasonable expectation of success. Finally, the combination must teach each and every claimed element. In the present case, claims 1-19 are not rendered unpatentable over the combination of Deguchi and Williams because the Examiner fails to establish a *prima facie* case of obviousness as discussed below.

Independent claim 1 defines an ion beam irradiation device. The device includes, *inter alia*, a holder supporting a substrate, an ion beam path, and an ion beam source that is a predetermined distance from the substrate and inclined to be substantially parallel with the substrate and that irradiates the substrate with an ion beam along the ion beam path. In addition, the ion beam is discharged from the ion beam source with an incidence angle with respect to the ion beam source that is greater than about 0°.

In rejecting claim 1, the Examiner asserts that Deguchi discloses an ion beam irradiation device as claimed, except for the ion beam irradiating the substrate at the recited angle ranges. In addition, the Examiner asserts that Williams discloses the desirability of varying the irradiation angle. Therefore, the Examiner asserts that it would have been

obvious to one skilled in the art to incorporate the teachings of Williams into Deguchi since Williams teaches increased reliability and productivity. These assertions are unfounded for the following reasons.

First, Deguchi not only fails to disclose the recited angles, as noted by the Examiner, but also fails to disclose irradiating the substrate with ion beams. To the contrary, Deguchi discloses irradiating diamonds with *cluster particles* wherein the cluster particles are made up of a plurality of molecules or atoms. In contrast, the present invention discloses an ion beam. Furthermore, Deguchi explicitly teaches away from ion beam irradiation because when single ions are used to irradiate/etch a polycrystalline diamond, the ions are injected into the diamond and damage the diamond. (See column 3, lines 10-19 of Deguchi).

Second, although Williams may disclose varying the incident angle of the ion beams during irradiation with respect to the substrate, Williams fails to disclose or suggest that the ion beam source is inclined to be substantially parallel to the substrate and that the incident angle with respect to the ion beam source is greater than zero. To the contrary, Williams explicitly discloses rotating the substrate while the ion beam source remains stationary (see Fig. 1 and column 8, lines 28-50 of Williams). Therefore, the ion beam source of Williams cannot possibly be interpreted as being inclined to be parallel with the substrate as claimed.

Since Deguchi and Williams each fail to disclose or suggest an ion beam irradiation device that includes an ion beam source that is a predetermined distance from the substrate and inclined to be substantially parallel with the substrate and that irradiates the substrate with an ion beam along the ion beam path, wherein the ion beam is discharged from the ion beam source with an incidence angle with respect to the ion beam source that is greater than zero degrees as claimed, the combination of these two references cannot possibly disclose said features. Therefore, even if one skilled in the art were motivated to combine Deguchi and Williams, which Applicants do not concede, the combination would still fail to render

claim 1 unpatentable for at least the reason that the combination fails to disclose each and every claimed element.

Independent claim 14 defines a method of irradiating a substrate with an ion beam. The method includes, *inter alia*, supporting a substrate with an alignment layer at a first angle, and producing ion beams to simultaneously irradiate the whole substrate with ions, wherein the ion beams strike the substrate with the same incidence angle and energy across the substrate, and wherein the ion beams all travel the same distance and the incidence angle is greater than about 0°.

In rejecting claim 14, the Examiner asserts that Deguchi discloses supporting a substrate with an alignment layer at a first angle and producing ion beams to irradiate the whole substrate with ions. This assertion are unfounded for the following reasons.

First, as discussed above, Deguchi discloses irradiating a diamond with cluster particles, not ion beams as claimed. (See discussion above with respect to claim 1). Second, the mask material (24) disclosed in Deguchi is not an alignment layer as claimed. Finally, nowhere in Deguchi is there any disclosure or suggestion of producing ion beams to simultaneously irradiate the whole substrate, wherein the ion beams strike the substrate with the same incidence angle and energy across the substrate, wherein the ion beams all travel substantially the same distance and the incidence angle is greater than zero degrees.

Since both Deguchi and Williams fail to disclose or suggest a method of irradiating a substrate with an ion beam that includes producing ion beams to simultaneously irradiate the whole substrate, wherein the ion beams strike the substrate with the same incidence angle and energy across the substrate, wherein the ion beams all travel substantially the same distance and the incidence angle is greater than zero degrees as claimed, the combination of these two patents cannot possibly disclose said features. Therefore, even if one skilled in the art were motivated to combine Deguchi and Williams, which Applicants do not concede, the

combination would still fail to render claim 14 unpatentable for at least the reason that the combination fails to disclose each and every claimed element.

Claims 2-8 and 15-19 variously depend from independent claims 1 and 14. Therefore, claims 2-8 and 15-19 are patentably distinguishable over the combination of Deguchi and Williams for at least those reasons presented above with respect to claims 1 and 14. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-8 and 11-19 under 35 U.S.C. §103(a).

The application is in condition for allowance. Accordingly, Applicants respectfully request entry of the above-identified amendment and allowance of the applications. Should the Examiner find the application other than in condition for allowance, the Examiner is invited to call the undersigned at the telephone number provided below. All correspondence should continue to be sent to the below-listed address.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911.

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Respectfully submitted,

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